Perspectives from the Clean Energy Ministerial and the International Smart Grid Action Network

22 March 2016
Atlanta, U.S.

Agenda

- Clean Energy Ministerial
- International Smart Grid Action Network
- ISGAN – Annex 6: Power T&D systems

ISGAN in Summary

INTERNATIONAL SMART GRID ACTION NETWORK (ISGAN)

'Strategic platform to support high-level government attention and action for the accelerated development and deployment of smarter, cleaner electricity grids around the world'

CLEAN ENERGY MINISTERIAL
Accelerating the Transition to Clean Energy Technologies

iea Energy Technology Network

- An initiative of the Clean Energy Ministerial (CEM)
- Organized as the Implementing Agreement for a Co-Operative Programme on Smart Grids (ISGAN)

The CEM is the only multilateral forum dedicated to the advancement of clean energy technologies and related policies. ISGAN is the only global government-to-government forum on smart grids

CEM initiative

ISGAN is one of ten CEM Initiatives

ENERGY DEMAND	ENERGY SUPPLY	ENERGY SUPPLY	CROSSCUTTING SUPPORT
Electric Vehicles Initiative	Multilateral Solar and Wind Working Group	21st Century Power Partnership	Clean Energy Solutions Center
Energy Management Working Group		Global Lightning and Energy Access Partnership	Clean Energy Education and Empowerment (C3E)
Super-efficient Equipment and Appliance Deployment		Global Sustainable Cities Network	
		International Smart Grid Action Network	

IEA Technology Collaboration Programme

ISGAN is one of IEA´s Technology Collaboration Programmes

ISGAN in Summary

Activities in ISGAN build a global understanding of smart grids, address gaps in knowledge and tools, improve peer-to-peer exchange, recognize excellence

☐ **ISGAN's strength includes:**

① Broad Expert Network

ISGAN leverages expertise from governments, national laboratories and research institutions, transmission and distribution system operators, power generators, and others from 25 countries from five continents

② Partnerships with Thought Leaders

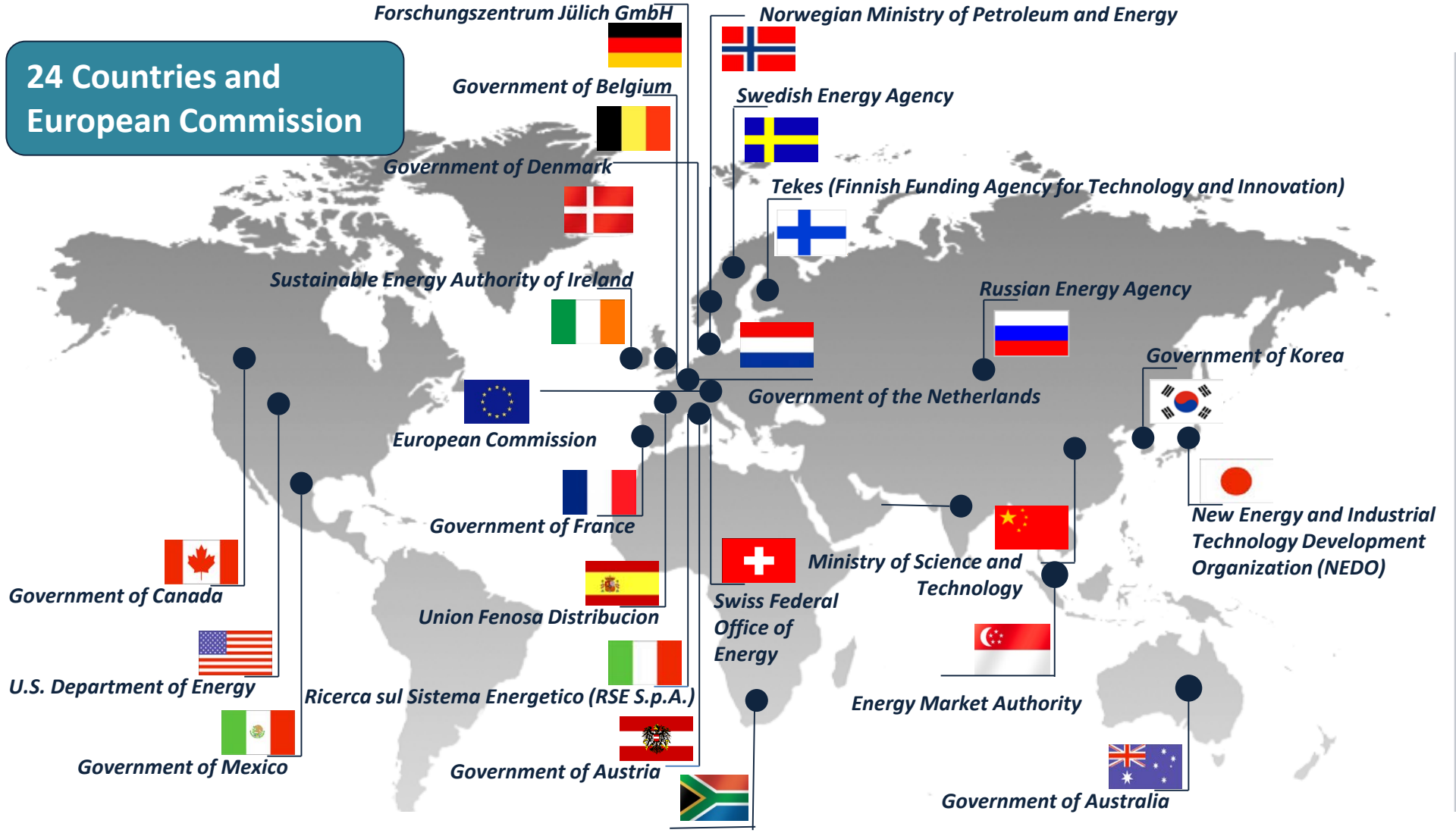
ISGAN engages leading private sector smart grid initiatives, the IEA Energy Technology Network, and other Clean Energy Ministerial initiatives to advance systems perspectives on power grids and grid integration

③ Diverse Portfolio

ISGAN implements a range of activities to support a better global understanding of smart grids and the value they offer, address gaps in knowledge and tools, enhance peer-to-peer exchange, and otherwise improve international coordination

ISGAN Participants

24 Countries and European Commission



Work programme

Foundational Projects (Global Understanding & Tools)

Technical Projects

Other Projects

Annex 1: **Global Smart Grid Inventory**

Annex 2: **Smart Grid Case Studies**

Annex 5: **Smart Grid International Research Facility Network (SIRFN)**

Annex 7: **Smart Grid Transitions - Institutional Change**

Annex 3: **Benefit-Cost Analyses and Toolkits**

Annex 4: **Synthesis of Insights for Decision Makers**

Annex 6: **Power T&D Systems**

ISGAN Award of Excellence

Virtual Training Academy (In progress)

Objective of ISGAN Annex 6

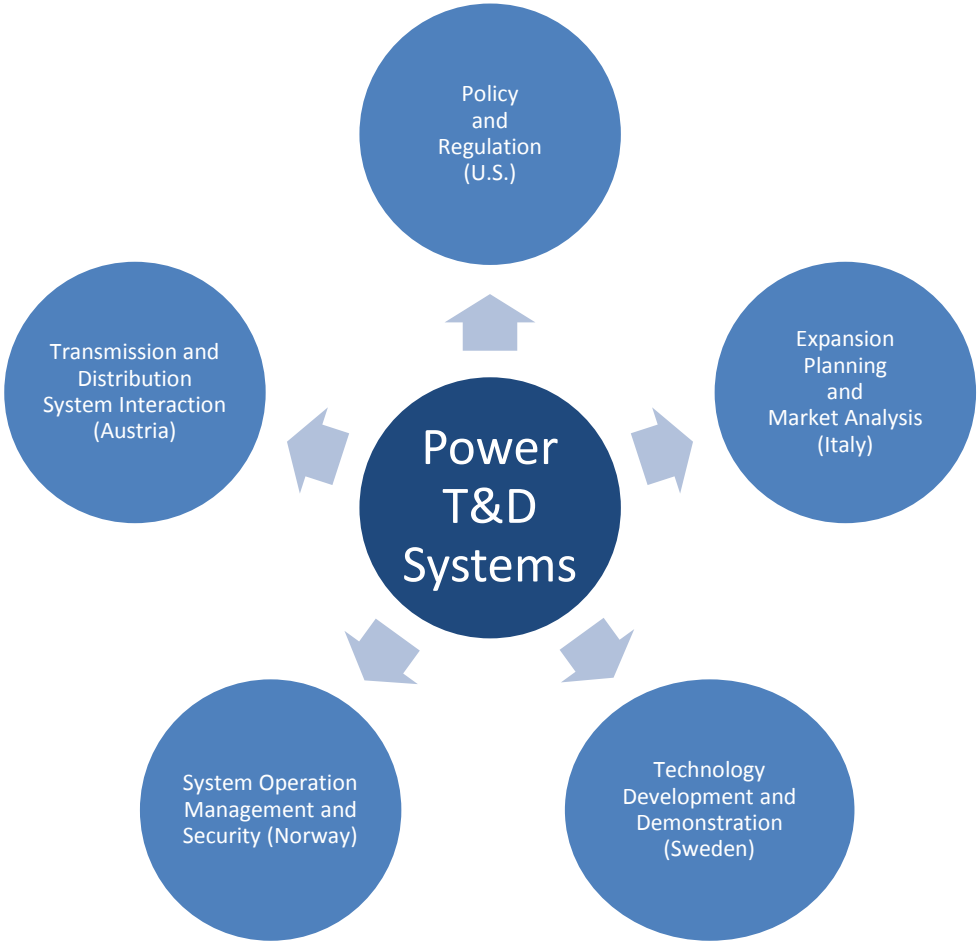
- Facilitate the deployment of smarter and stronger power grids given significant trends in the industry (e.g. integration of large amounts renewable energy sources, aging infrastructure, integration of information technology systems)
- Condense to conclusions and recommendations for policy makers

The main objective of this Annex is to establish a long term vision for the development of "Smarter and Stronger Power T&D Systems". The Annex shall consist of efforts to improve understanding of Smart Grid technologies applicable to or influencing power system performance, transmission capacities and operating practices; accelerate their development and deployment; and promote adoption of related enabling regulatory and government policies.

From "OBJECTIVES" in the PoW for Annex 6

Annex 6
participating countries

Sweden (lead)
Austria
Belgium
Denmark
France
India
Italy
Norway
South Africa
United States
Ireland
Canada



Outputs

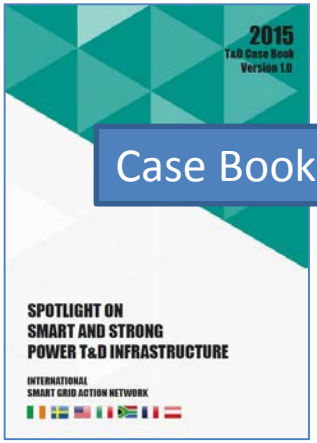
Discussion Papers

Messages for policy makers

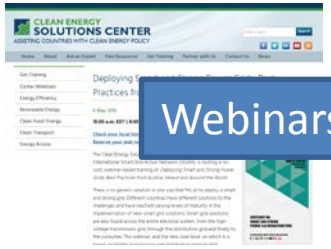
Technology brief

Workshops

Papers



Case Book

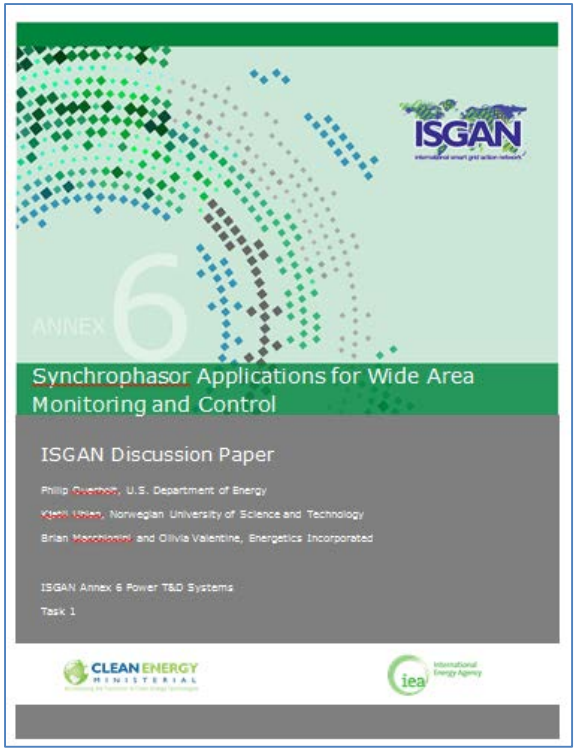


Webinars

Upcoming deliverables

- T&D Case Book
  - SPOTLIGHT ON SMART AND STRONG POWER T&D INFRASTRUCTURE ver. 2.0
- Discussion papers
  - Storage and balancing as key elements for future planning and electricity markets
  - Synchrophasor Applications for Wide Area Monitoring and Control
  - The role and interaction of microgrids and centralized grids in developing modern power systems – A case review
  - Tools for Power Balancing Assessments
  - Network Integration of Electrical Vehicles
  - TSO – DSO interaction: Investigation of the practical implementation of a single marketplace for flexibility
- Workshops
  - Joint symposium with other IEA Technology Collaboration Programmes

Synchrophasor Applications for Wide Area Monitoring and Control



Philip Overholt, U.S. Department of Energy
Kjetil Uhlen, Norwegian University of Science and Technology
Brian Marchionini and Olivia Valentine, Energetics Incorporated

OVERVIEW

- Advanced analytical applications are being developed to effectively analyze and utilize the vast amounts of data being generated by PMUs.
- These applications are being used to improve grid reliability and efficiency and lower operating costs.
  - Ability to see oscillations and other dynamics on the grid
- The discussion paper describes synchrophasor applications for wide area monitoring and control in North America and Norway.
- This document reviews principal applications groups in the categories of real-time and offline.

Benefits of Synchrophasor Technology, by Application[1]

	Increased System Reliability	Increased Asset Utilization and Power System Efficiency	Increased Organizational Efficiency
Real Time			
Wide area visualization	✓		✓
Frequency stability monitoring and trending	✓		
Voltage monitoring and trending	✓		
Oscillation detection	✓		
Phase angle monitoring and trending	✓	✓	
Resource integration		✓	
Adaptive islanding and black-start capability	✓		
Event detection	✓		✓
Adaptive relaying	✓		
Power system stabilizer/oscillation damper	✓		
Automated protection	✓		
State estimation	✓		
Off-Line			
Post-event analysis	✓		✓
Model validation	✓	✓	✓

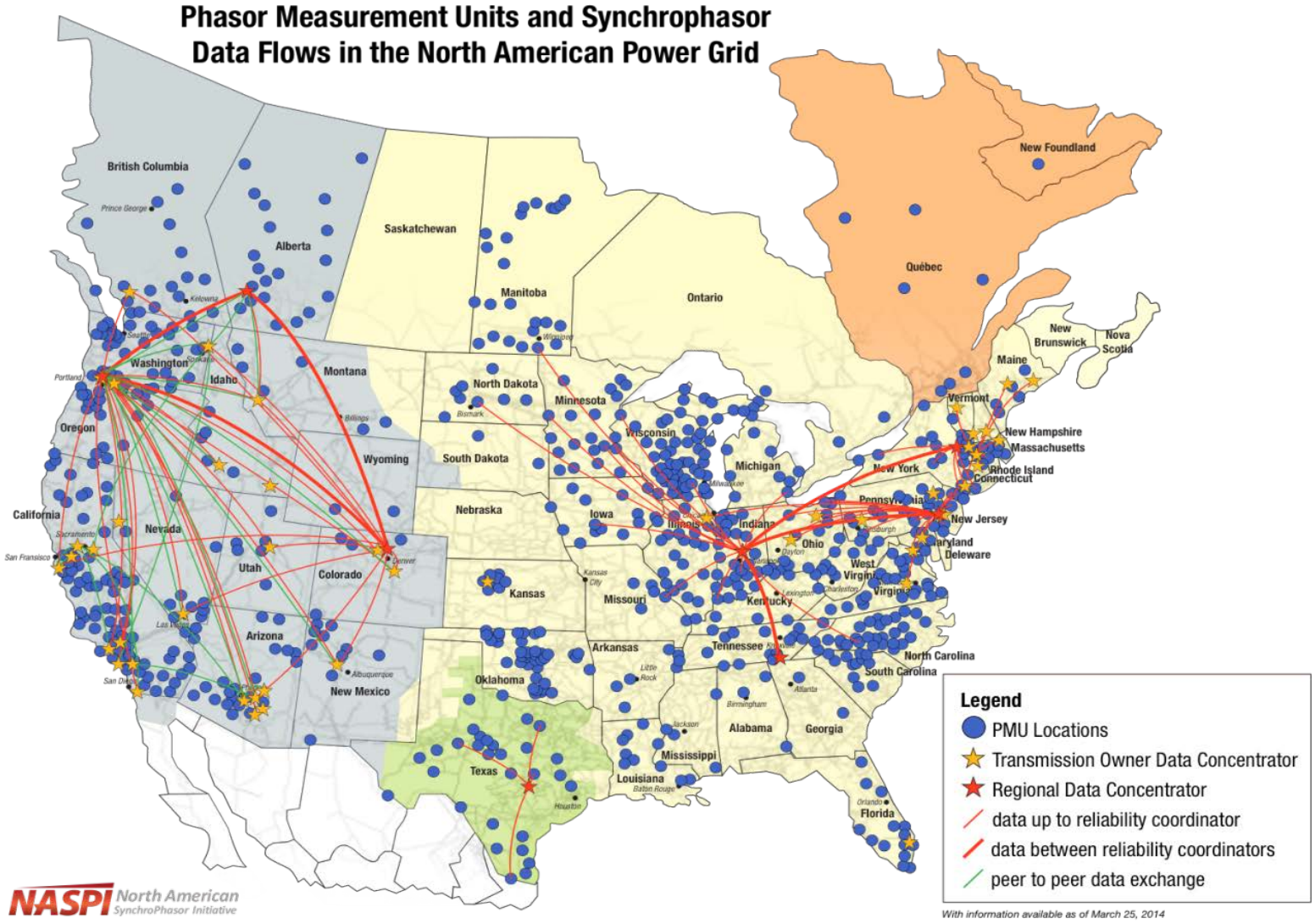
[1] Adapted from the Advancement of Synchrophasor Technology in Projects Funded by the American Recovery and Reinvestment Act of 2009, U.S. Department of Energy, Electricity Delivery and Energy Reliability.

Norwegian Experience

- Stability constraints on power transfers in the Nordic grid motivates the use of PMUs and Wide-Area Monitoring System (WAMS).
- Statnett SF, the Norwegian transmission system operator has deployed PMUS and supported R&D efforts since early 2000.
- One result is the implementation and testing of a Wide-Area Control Systems (WACS) for Power Oscillation Damping.
- Responsibility for deployment of PMUs has gradually moved from R&D into the operational division of the TSO.
- A main experience is that successful deployment of synchrophasor applications requires a close dialog between researchers/developers and users.
- http://www.nordicenergy.org/wp-content/uploads/2015/11/STRONgrid.pdf

Installed (green) and immediately planned (red) PMUs in the Norwegian transmission grid.

Deployment of a Continental PMU Network



Annex 6 Collaborations

- Joint workshops and symposium with relevant organizations like NASPI and other IEA Technology Collaboration Programmes
- Members of advisory boards of two big EU funded project
  - Best Paths and SmartNet
- Collaboration with other ISGAN Annexes
- Working relationship with Clean Energy Ministerial, GSGF, 21st CPP, CEER, ENTSO-E, EDSO for smart grids, …
- Attendance and publications at relevant conferences
- Member relations

ISGAN Award

International competition to showcase global excellence, ***leadership and innovation*** *in smart grid projects*

- Theme for 2016:
  “Smart Grids for Reliable Electricity Service”

- Deadline for submission: March 24th

Detailed information on:
http://www.iea-isgan.org/index.php?r=home&c=395/422

- ISGAN Website:
  http://www.iea-isgan.org

  SG Case Books, Insight Papers & Discussion Papers are available!

- ISGAN Secretariat e-mail:
  isgan@smartgrid.or.kr

- CEM Website:
  http://www.cleanenergyministerial.org

- IEA page on Technology Collaboration Programmes:
  http://www.iea.org/tcp

Thank you!